MINOR PHYSICAL ANOMALIES AND LEARNING DISABILITY: WHAT IS THE PRENATAL COMPONENT?

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The authors performed a case-control study of 60 school children who were examined for a constellation of anomalies suggestive of fetal alcohol exposure. Nonretarded learning disabled children were 7.25 times (95%, confidence interval, 1.05 to 50.0) more likely than controls to have signs consistent with alcohol exposure in fetal life. These data suggest an expanded spectrum of fetal alcohol effects. Early recognition of minor physical anomalies could result in prompt evaluation and treatment of these children.

Alcohol is a commonly used substance that is known to have toxic effects on the fetus. Numerous studies have suggested that alcohol adversely affects a variety of reproductive and fetal outcomes.[1-4] Children born to chronic alcoholics may develop fetal alcohol syndrome (FAS) and exhibit severe mental retardation.[1] Alcohol-exposed infants, without FAS, display increased nervousness, irritability, and other central nervous system (CNS) signs.[4]

Deficits in learning and behavior may be CNS manifestations of prenatal alcohol exposure.[5] This association is difficult to assess because of the long latent period until diagnosis. However, the distribution of minor physical anomalies in nonretarded, learning-disabled children into the pattern associated with FAS could be evidence of an alcohol-learning disability linkage.

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METHODS

Subjects

The subjects of the study were 30 nonretarded, learning-disabled children between the ages of 7 and 11 years (IQ 70 to 110) who had been initially placed, but failed to learn, in a regular classroom. These children were classed as perceptually impaired or communicatively handicapped in accordance with Chapter 28 of the New Jersey Administrative Code. Of 36 special education enrollees, 30 returned signed parental consent forms and participated.

Controls were drawn from the roster of children in regular classrooms who had not ever been placed or recommended for placement in special education programs and matched to cases for age and sex.

Procedure

Assessments were performed blindly by an experienced behavioral-developmental pediatrician (R.M.). Screening protocols recorded (1) minor congenital anomalies as defined by Smith[6] and described by Waldrop et al,[7] (2) performance on a series of pediatric neurodevelopmental screening tests, (3) height, and (4) head circumference.

Each child was rated for signs of fetal alcohol exposure[8] as follows:

1. Head circumference more than one standard deviation (SD) below norm for age and sex[9]
2. One or more craniofacial anomalies (hypoplastic philtrum, thin vermillion, micrognathia, slanted palpebral fissure, palpebral fissure width more than 1 SD below norm[10,11]

TABLE 1. MINOR PHYSICAL ANOMALIES BY LOCATION

System	Odds Ratio	95% Confidence Interval	
		Lower Limit	Upper Limit
Eyes	0.75	0.39	1.41
Ears	1.37	0.29	1.59
Facies	4.33	1.26	14.9
Neck	0	—	—
Oropharynx	5.09	1.11	7.57
Skeleton	8.82	1.36	57.4
Skin	0.64	0.09	4.34
One or more	5.0	1.32	18.9
Head Circumference, 1 SD	1.82	0.52	6.7
Height, 1 SD	1.16	0.39	3.5
Cluster of signs suggestive of fetal alcohol exposure			
Group 1 (signs in 4 categories)	7.25	1.05	50.0
Group 1 or 2 (signs in at least 3 of 4 categories)	5.09	1.09	23.6

3. Height more than 1 SD below norm for age and sex[12]

4. One or more signs of CNS impairment (tremors, past pointing, disdiadochokinesia, clumsy finger-to-finger performance, synkinesis, ataxic tandem gait, and poor right-left discrimination)

The children were divided into three groups: (1) Those with features compatible with fetal alcohol exposure, abnormal findings in each of the categories given above (group 1), (2) those with height within 1 SD who had abnormal features from the remaining three categories (group 2). (A possible subset who experienced fetal alcohol exposure and later catch-up growth[13]) and (3) those without features suggestive of fetal alcohol exposure.

Determinations of current maternal alcohol abuse were based on parental histories obtained from school, medical, and social service records and on the detailed records of home visits made by the school social worker. Access was permitted by the school only for children in group 1 and group 2; personal interviews with parents were forbidden by the school system.

The occurrence of minor anomalies was compared between cases and controls by computing the odds ratio and its 95 percent confidence intervals.[14]

RESULTS

Children in special education programs were five times more likely to have one or more minor physical anomalies in comparison with children in the control group (Table 1). They also evidenced an excess of anomalies in the following locations: the facies, odds ratio (OR), 4.33 (nasal philtrum, vermillion border, chin), the oropharynx, OR, 5.09 (palate and teeth), and the skeleton, OR, 8.8 (hands, feet and nails). Table 1 also depicts the odds ratio for a pattern of anomalies consistent with fetal alcohol exposure in special education vs regular classrooms. Of the 30 children in special education classrooms, 20 percent had abnormal findings in each of the four categories (group 1) and an additional two had findings except for linear growth (group 2). Of the 30 children in regular classrooms, one showed abnormal features in four categories (group 1) and one other had findings excluding linear growth (group 2). Thus children in special education were five to seven times more likely to have features compatible with fetal alcohol exposure than children in regular classrooms.

Eight mothers of the ten children screening positive (group 1 or 2) were identified by school social work records as current alcohol abusers; three were also noted as marijuana users; one father (special education group) was noted to be a chronic alcoholic. The two remaining mothers (one special education and one regular classroom) did not have a history of alcohol or drug abuse. There was no other evidence of alcohol abuse in the school records of controls.

DISCUSSION

Data from the present study showed an excess of minor physical anomalies consistent with the pattern associated with FAS among children with learning disabilities. Shaywitz and Shaywitz[5] write, ". . . milder degrees of central nervous system dysfunction frequently may be encountered in the offspring of alcoholic women and suggest consideration of an expansion of the concept of the fetal alcohol syndrome to include behavioral and learning deficits as manifestations of central nervous system involvement." Facial dysmorphology may be a potential means of distinguishing intrauterine from postnatal environmental influences in children with learning problems. Early recognition of children at risk may result in timely referral for evaluation and intervention, thus preventing school failure and dropout.

An earlier uncontrolled investigation found that 17 percent of children referred for learning disabilities had mothers who drank during pregnancy.[15] These children also exhibited dysmorphic features suggestive of fetal alcohol exposure. The proportion of learning-disabled children with signs suggestive of fetal alcohol exposure in the present study (20 percent) agrees with these results.

One problem that is encountered in studying the etiology of learning disorders is the long latent period between exposure and identification, making retrospective data about the index pregnancy suspect. In the present study the school officially forbade us from interviewing parents of either learning-disabled children or controls regarding past or present drinking habits. Information from school records provides some support for the hypothesis of intrauterine alcohol exposure. Further study needs to be done to test this association in a group whose prenatal exposure status is known and recorded prior to the diagnosis of learning disability.

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